

Prevention of Secondary Attacks of Rheumatic Fever

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BASIC research into the etiology and pathogenesis of rheumatic fever is still urgently needed, since it is from such knowledge that ultimate control of the disease will be possible. However, one of our greatest practical problems in rheumatic fever prevention is not a lack of preventive measures, but rather a lack of effective application of available preventive measures.

Many physicians have the impression that rheumatic fever is no longer an important health problem in the United States. They do not see many cases in their practice—the classical manifestations of rheumatic fever are less common than a decade ago and the symptoms may be so mild that they may pass unnoticed. Therapeutic measures have also become more effective so that fewer deaths result even from the more severe attacks.

This is encouraging progress, but a look at some facts will reveal that much effort is still needed to control this largely preventable disease (table 1).

In 1954, 1,297 deaths were reported from acute rheumatic fever and rheumatic carditis. Another 18,256 deaths resulted from the effects of chronic rheumatic heart disease. This contrasts with poliomyelitis which resulted in 1,368 deaths during that year. Like poliomyelitis, rheumatic fever is largely a crippling disease, and its impact results mainly from chronic disability and, later, death from chronic rheumatic heart disease. Certainly, more than 19,000 deaths each year from the acute and chronic effects of rheumatic fever leave little room for complacency. Every State in the United States reported deaths from rheumatic

fever and rheumatic heart disease in 1955. The age-adjusted death rates from rheumatic fever and rheumatic heart disease are as high in some southern States as in some northern States. However, in general, the death rates are higher in the Rocky Mountain areas, New England, and the Middle Atlantic States.

In approximately 30 States, rheumatic fever is a reportable disease. But if we considered the number of reported cases as a true index of the actual number occurring, we would be greatly misled. For example, a comparison of the reported deaths from acute rheumatic fever and rheumatic carditis (table 1) with the total number of reported cases of rheumatic fever (see below) during the years 1949 through 1955 would imply a fatality rate ranging from approximately 50 to 30 percent. This obviously is not consistent with clinical experience.

Year	Number of cases
1949.....	4,457
1950.....	3,635
1951.....	3,883
1953.....	3,642
1954.....	4,230
1955.....	3,690

SOURCE: Worksheets, National Office of Vital Statistics.

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Table 1. Deaths from poliomyelitis, acute rheumatic fever and rheumatic carditis, and rheumatic heart disease, United States

Year	Poliomyelitis (080)	Acute rheumatic fever and rheumatic carditis (400-402)	Chronic rheumatic heart disease (410-416)
1949.....	2, 720	2, 304	20, 434
1950.....	1, 904	1, 924	20, 392
1951.....	1, 551	1, 648	19, 988
1952.....	3, 145	1, 583	19, 754
1953.....	1, 450	1, 523	19, 587
1954.....	1, 368	1, 297	18, 256
1955.....	1, 043	1, 150	18, 760

NOTE: Numbers in parentheses are from the International Lists of Diseases and Causes of Death, sixth revision.

SOURCE: National Office of Vital Statistics, Public Health Service.

Rather, it probably indicates a large under-reporting of rheumatic fever cases. Perhaps a better indication of the under-reporting of rheumatic fever can be seen from a recently reported Minnesota study (1). The results of this survey are shown in table 2.

Approximately 200 cases of rheumatic fever were reported yearly by physicians in that State during 1950-54. In 1955 the Minnesota Department of Health and the Minnesota Heart Association conducted a special letter survey, asking each physician how many cases of active rheumatic fever he had treated during the preceding 12 months. The physicians reported that they had treated 2,297 cases during 1955. Although the accuracy of diagnosis was not verified, this is 10 times the number actually reported in previous years and is more than half the total number officially reported from over 30 States during that year.

The prevalence of rheumatic heart disease is not known, but it is conservatively estimated that approximately 1 million persons in the United States have been afflicted by this disease. Selected surveys of school children since 1945 have revealed a prevalence of rheumatic heart disease ranging from 0.2 to 4.6 percent of those examined (2, 3). The statewide survey of sixth grade Colorado school children by Maresh, Dodge, and Lichty revealed that 0.67 percent have rheumatic heart disease (4).

In about 11½ million registrants between the ages of 18-25 examined by the Selective Service System in the years 1940-1944, 1.8 percent were found to have rheumatic heart disease or valvular heart disease (5).

A recent careful clinical study of a random sample of the adults in Framingham, Mass., a community of approximately 30,000 population, has revealed a prevalence of rheumatic heart disease in 2.4 percent of the population 30-39 years of age (6).

Surveys of college students (7) have found somewhat under 1 percent with rheumatic heart disease (table 3).

The American College Health Association and the Heart Disease Control Program of the Public Health Service began a cooperative study in the fall of 1956 to determine the trend of prevalence of rheumatic heart disease among entering freshman students. Student health service physicians of 132 colleges and universities are participating in this study. Preliminary data relating to a previous history of rheumatic fever and results of entrance physical examinations are now available for 65 colleges, representing 54,058 freshman students. A previous history of definite rheumatic fever was elicited in 1.2 percent of the students. An additional 0.9 percent had a history consistent with previous possible rheumatic fever.

Physical examination findings considered to be adequate for a diagnosis of definite rheumatic heart disease were present in 0.3 percent of entering freshmen. An additional 0.6 percent had findings diagnosed as probable rheumatic

Table 2. Minnesota rheumatic fever experience, 1950-55

Year	Number cases reported	Number receiving prophylaxis
1950 ¹	162	-----
1951 ¹	170	-----
1952 ¹	221	-----
1953 ¹	235	-----
1954 ¹	148	-----
1955 ²	2, 297	3, 323

¹ Cases reported yearly to Minnesota Department of Health.

² Special mail survey (1).

heart disease. It is hoped that continuation of this study for the next few years will provide an index of the trend of prevalence of rheumatic heart disease in this selected population group.

Community Prophylaxis

Many studies in the past two decades have emphasized the relationship between beta hemolytic streptococcal infections and the subsequent development of rheumatic fever (8, 9). The number of reported cases of scarlet fever and streptococcal sore throat has actually increased in the last 5 years in the United States as shown below :

Year	Number of cases
1949	87, 220
1950	64, 494
1951	84, 151
1952	113, 677
1953	132, 935
1954	147, 785
1955	147, 502

SOURCE: Reported cases of specified notifiable diseases: United States 1945-54. Data for 1955 from pre-publication worksheet, National Office of Vital Statistics.

Practicing physicians and health officers should be alert to recognize outbreaks of streptococcal infections since effective measures for their treatment are now available. The need for community prophylaxis of streptococcal infections was pointed up by the recent resolution of the Association of State and Territorial Health Officers "That trials and further study of the use of penicillin in mass prophylaxis for the control of an outbreak of streptococcal infections be encouraged" (10). An excellent report of the experience in the prophylaxis of civilian streptococcal outbreaks in New York State has been made by Poskanzer and associates (11).

Prompt treatment of such streptococcal infections can largely prevent the subsequent development of rheumatic fever. The youngster who has had one attack of rheumatic fever is especially susceptible to recurrences if new streptococcal infections develop. Continuous prophylaxis with penicillin or sulfonamides is indicated for children with a known history of rheumatic fever since the risk of recurrence is

as high as 50 percent following such streptococcal infections, as shown in table 4 (12). Many streptococcal infections go undetected, however, and the first indication of trouble may be in the actual flareup of a new attack of rheumatic fever.

The classic study which reveals the risk of recurrent attacks of rheumatic fever and the natural history of the disease was done by Dr. E. F. Bland and the late Dr. T. Duckett Jones (13).

One thousand children who had had rheumatic fever were followed carefully for 20 years during the era before sulfa and penicillin prophylaxis. Approximately 20 percent of the children had a recurrent attack of rheumatic fever each year in the first 5 years from the date of the initial attack. Approximately 10 percent had recurrent attacks each year during the next 5 years, 5 percent in the third 5 years, and 1.5 percent in the last 5 years. Evidently the risk of recurrence is especially high in the years immediately following the initial attack, but attacks can occur at any time. Eighty percent of the deaths during this period were caused by recurrent attacks of rheumatic fever. This and other important studies support the strong recommenda-

Table 3. Reported prevalence of rheumatic heart disease in college students ¹

Source	University	Number examined	Percent with rheumatic heart disease
Lee (1915)-----	Harvard students. ²	662	1. 5
Paul and Leddy (1932).	Yale students ² ---	7, 914	. 8
Wood (1932)-----	Yale students ² ---	4, 455	1. 1
	University of Pennsylvania.	3, 086	1. 0
Hedley (1938)----	86 universities---	104, 163	1. 2
	14 universities---	46, 098	. 6
Cole (1941)-----	University of Wisconsin.	28, 139	. 8
Contratto (1943)-	Harvard freshmen. ²	2, 856	. 3
Shearer et al. (1952).	University of Colorado.	3, 645	. 7
Goggio (1952)----	University of California.	11, 096	. 3

¹ Modified from Shearer et al. (?).

² Males.

Table 4. Frequency of rheumatic fever recurrences following proved group A streptococcal infections

Treatment status	Number of streptococcal infections	Recurrences of rheumatic fever	
		Number	Per cent
Not treated with penicillin.....	11	6	54
Treated with oral penicillin.....	25	2	8

SOURCE: Reference 12.

tions of the Committee on Prevention of Rheumatic Fever and Bacterial Endocarditis of the Council on Rheumatic Fever and Congenital Heart Disease (14). The committee recommends that children who have had rheumatic fever be maintained on a regimen of continuous prophylaxis indefinitely.

We know that continuous prophylaxis can reduce the rheumatic fever recurrence rate by well over 85 percent if conscientiously carried out (15, 16). Experience reveals that either oral sulfadiazine, oral penicillin, or benzathine penicillin administered intramuscularly can be effective (table 5). However, there have been more frequent breakthroughs of streptococcal infections on sulfadiazine and on oral penicillin than with intramuscular benzathine penicillin (17). An increase in the dosage of oral penicillin of 200,000 or 250,000 units twice a day is now being recommended by the Committee on

Table 5. Effect of prophylaxis on recurrences of rheumatic fever

Prophylaxis status	Type of prophylaxis					
	Sulfonamide				Oral penicillin	
	Patient-years	Rheumatic attacks		Patient-years	Rheumatic attacks	
		Number	Per cent		Number	Per cent
Control.....	1, 697	238	14. 0	932	81	8. 7
Prophylaxis....	1, 358	27	1. 9	740	5	. 6

SOURCE: Modified from Stollerman (16).

Prevention of Rheumatic Fever and Bacterial Endocarditis in its revised prevention statement (14). These basic recommendations are sound and can be used in planning community rheumatic fever prevention programs.

Most States have some type of rheumatic fever program. Some of these have been in operation for many years. Since 1939, a great deal has been accomplished through the support of State rheumatic fever programs by the Children's Bureau, but there is still much to be done. We have not fully persuaded physicians, parents, and patients on the importance of preventing rheumatic fever recurrences. For example, the survey of college students that is now being carried on by the Heart Disease Control Program in cooperation with the American College Health Association is revealing a glaring lack of prophylaxis in the known cases of rheumatic heart disease either following the initial attack or at the present time. In these preliminary data, only 73 out of 659 college students with a known history of rheumatic fever are on any kind of prophylaxis. We certainly cannot say we have succeeded in getting across the message of continuing prevention of recurrent attacks of rheumatic fever when only 11 percent of these known cases are following any type of prophylactic regimen.

A recent report from Herrick House (18) emphasizes this discouraging state of affairs.

A 1955 annual followup of 100 children discharged after participating in a program of accelerated rehabilitation following an acute attack of rheumatic fever showed that 1 year later 29 of the 100 were receiving no medical care. Of the 71 under medical care, 38 were getting no prophylactic medication. Thus, 67 of the 100 were receiving no prophylaxis for rheumatic fever recurrences.

Making penicillin available to physicians for treating patients with a history of rheumatic fever is not always a solution. The physician committee of one heart association voted to provide oral or benzathine penicillin to physicians who had rheumatic children under their care. Approximately 90 such cases were reported as known to the practicing physicians in that community. One year later a review of the program revealed that only about six

children out of this group could be said to have followed a satisfactory preventive regimen.

Essential Program Features

What are some of the essential features in a successful rheumatic fever prevention program? Perhaps most important is the sincere interest of physicians and community agencies in setting up an effective mechanism for maintaining a long-term prophylaxis program.

The problem of rheumatic fever prevention cannot be solved by physicians alone, by the patients alone, by the health department alone, or by the heart association alone. This is a problem that requires community interest and

cooperation. Planning such a program should be done with the cooperation of all the interested groups concerned. No blanket program will meet the needs of every community, but rather each community's individual needs, and its resources available to meet these needs, must be visualized in planning a program (see inset below).

Basic to any program plan is the continuing interest and support of the practicing physicians, parents, school nurses and teachers, public health nurses, and social workers. Each of these must believe in the value of what is being done and the importance of following the long-term regimen. If the physicians are not convinced, certainly it is hard to expect that

IMPORTANT PROGRAM ELEMENTS

cooperative planning
by interested community groups

- ★ Practicing physicians
- ★ Health department
- ★ Heart association

educational program
enlisting cooperation of

- ★ Physicians and clinics
- ★ Parents
- ★ School system
- ★ Public health nurse

diagnostic services
for problem cases

- ★ Cardiological consultation
- ★ Laboratory services

up-to-date register
maintained by health department

- ★ Focal point and responsible agency
for long-term followup

prophylactic penicillin

- ★ Low cost for nonindigent patients
- ★ Free for indigent patients

effective followup
plus services

- ★ Prevent lapses from medical supervision
- ★ Prevent lapses in prophylaxis
- ★ Provide nursing services, home teaching,
social services, other services as needed

parents and children will be convinced of the importance of prevention.

The Case Register

An important device for developing an effective program is the case register. Case registers have been used successfully for many years in tuberculosis and other health programs requiring long-term followup. The case register provides a central mechanism which shows whether or not the rheumatic patient stays under medical supervision and receives prophylaxis regularly. Several cities have developed effective case registers and followup services. New York City, San Francisco, and Chicago are examples of such programs in larger cities. Pueblo, Colo., is an example of a program in a small city-county area. Fixing responsibility in one agency for the coordination of the program is important to the long-term success of the program.

Providing penicillin at a reasonable cost, or free when needed, is an important aspect of the prevention program. Patients enrolled on the register qualify for this penicillin, and it is made available on presentation of a prescription from the attending physician.

When the medical appointment is not kept or the prescription is not filled by a given date, followup begins. Clerks, public health nurses, or the medical social worker may be called on to look into the reason for lapses from care, depending on the nature of the problem involved.

Within a well-developed program of rheumatic fever prevention there will be a mechanism for adding new cases to the register as they are detected in school health programs or through other means. Private and public facilities for the evaluation of diagnoses are also needed, for it is as important to avoid imposing an unnecessary prophylactic regimen on a child with a functional murmur as it is to keep the child with true rheumatic fever on prophylaxis.

A label of heart disease not only may cause adverse psychological problems but may also create later difficulties in obtaining employment, or it may increase costs of personal insurance.

Availability to physicians of accurate and

convenient laboratory services for processing throat cultures of patients with suspected streptococcal disease is a fundamental part of an effective rheumatic fever prevention program. Streptococcal antibody tests such as the anti-streptolysin O titer should also be available through some central laboratory to help clarify the diagnosis when rheumatic fever is suspected (19).

The focus of attention on the problem of preventing rheumatic fever recurrences is in itself important, but the other problems that require attention should not be overlooked. The family, school, and vocational problems can be met more readily by community services if the framework of a rheumatic fever prevention program exists.

Summary

Although basic research into the etiology and pathogenesis of rheumatic fever is still urgently needed, one of the greatest practical problems in rheumatic fever prevention is a lack of effective application of available preventive measures.

Every State in the United States reported deaths from rheumatic fever and rheumatic heart disease in 1955. Progress in the control of rheumatic fever through the prevention or prompt treatment of streptococcal infections has resulted in the impression that this disease is now of minor importance. This is not true.

Current experience reveals that individual efforts of physicians or patients are not enough to maintain interest in and adherence to prescribed preventive measures. Approximately an 85-percent reduction in recurrences of rheumatic fever could be expected if current recommendations on prophylaxis of rheumatic fever were followed conscientiously.

Health departments, heart associations, and practicing physicians need to join forces in developing effective community rheumatic fever prevention programs that will assure the application of proved measures for the prevention of rheumatic fever.

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Violations of Interstate Quarantine Regulations

In the first conviction on violations of the interstate quarantine regulations, five hog feeders were recently found guilty by the United States District Court of Camden, N. J., of interstate transportation and feeding of uncooked garbage to hogs. The regulations under which they were convicted require that all garbage carried in interstate traffic and fed to swine must be cooked or heat treated to destroy agents of trichinosis.

The convicted hog feeders were placed on probation for 2 years under Public Health Service supervision, and warnings were issued that like violations will be prosecuted.